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ABSTRACT

A 2 x 2 factorial design was used to investigate the effect on teaching competencies (measured by applying the Instrument for the Analysis of Science Teaching, the Classroom Observation Rating Form, and the Teacher Performance Competencies Scale to videotapes of subjects teaching in one-to-one or one-to-two situations), and attitudes (measured by a semantic differential) toward a number of aspects of teaching practice and theory. The student teachers taught microlessons to elementary school pupils or to their peers in the science methods class. The other variable was presence or absence of feedback from an experienced teacher. Students who taught peers developed competencies and attitudes similar to those of students who taught children, although some pacing skills and questioning techniques were only developed by those teaching children. Systematic feedback from experienced teachers was necessary for the improvement of lesson pacing and clarity of presentation. There were few differences in attitudes between the groups with or without feedback. (AL)

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A COMPARATIVE STUDY OF THE EFFECT OF PRACTICE WITH ELEMENTARY CHILDREN OR WITH PEERS IN THE SCIENCE METHODS COURSE

Alan Steinbach

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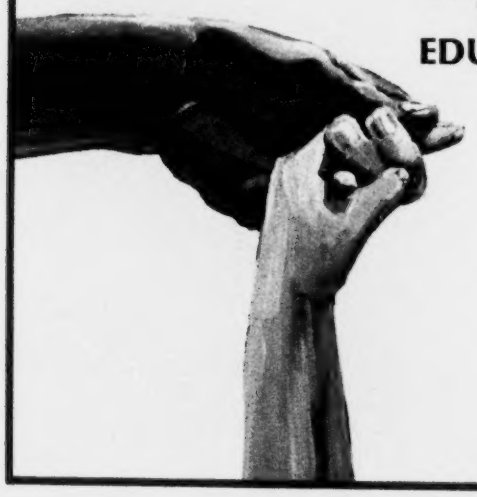
Report Series No. 10

THE RESEARCH AND DEVELOPMENT CENTER FOR TEACHER EDUCATION



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University of Texas at Austin

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There is general agreement that practice situations need to be provided in the pre-service training of elementary teachers. Conant (1963) found agreement among university, state and school personnel that practice opportunities in the teaching situation should be conducted under close guidance and supervision.

Dewey (1904) urged what might be described as a laboratory point of view in practice situations, such that application of principles suggested in the instruction courses may be carried out with a minimum of concern for classroom management. In contrast, the apprentice point of view emphasizes practice as a means to attain immediate proficiency, with the student teacher usually copying the techniques and practices of the cooperating teacher. Despite the many years that have intervened since Dewey's position statement of 1904, the practice experiences afforded prospective

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elementary teachers still seem to come closer to the apprentice rather than the laboratory point of view.

Goodlad (1965) notes that pre-service teachers have not been systematically introduced to the inquiry techniques and their implications for teaching; that the introductory education course provides no practice experiences or else goes to the opposite extreme of the apprentice point of view; that only a few instructors in the methods courses,

> with excessive expenditure of time and energy, manage to do a reasonably good job of arranging meaningful laboratory experiences to accompany their theoretical work (Goodlad, 1965, p. 265)

and that research shows the strong influence of the cooperating teacher upon the student teacher.

All too frequently, the propsective teacher has developed a view of teaching that is quite contrary to the student-centered, activity approaches espoused by the new curriculum programs in the elementary school. This distorted view would be quite similar to the following description by Flanders (1963):

> No matter what a prospective teacher hears in education course, he has, on the average, been exposed to living models of what teaching is and can be that are basically quite directive. After fourteen or so years he is likely to be quite dependent, expecting the instructor to tell him what to do, how to do it, when he is finished, and then tell him how well he did it (Flanders, 1963, p. 252).

Increasingly, the inclusion of practice within the framework of the methods course has been urged. Jackson (1967) urges this type of practice for sophomores and juniors to provide first-hand experience in working with children in individual and small-group situations prior to the actual student-teaching experiences. If such practice is under the close supervision of the college, it can enable the student to relate theory learned in the methods course to actual practice, and it can enable the college instructor to maintain close contacts with the practices of the elementary schools. Goodlad (1965) states the case more strongly:

> If there is any place in the teacher education program where theory and practice must be brought together, it is that phase called methods. . . The continued teaching of methods courses divorced from the classroom or its simulated likeness is a malpractice which we can ill afford to perpetuate (Goodlad, 1965, pp. 265-266).

Several mechanisms have been developed to provide such integration of theory and practice. Gega (1958) suggests that student teaching should be taken concurrently with the methods course so that the ideas gained from theory can be put into practice immediately.

Allen and Gross (1965) advocate a type of practice, microteaching, that has been used in the early part of the student-teaching course for secondary interns. Trainees are videotaped as they teach three or four students for a period of five to ten

minutes. After feedback from the supervising teacher and the pupils based on the videotape playback, the trainees reteach the same lesson to other students. This teach-reteach technique with small groups is later followed by regular classroom experience. Allen and Fortune (1965) reported that follow-up studies indicated a high correlation between ratings of the student's performance in the micro-teaching session with ratings of his performance in the regular classroom.

Drumheller and Paris (1966) suggest a similar approach for the methods course. Under their direction, students worked in groups of ten as they planned a four-week unit together and then each taught 12 lessons of that unit. Each student taught three or four children for 25-minutes for each lesson. Feedback was provided for each student in seminars which included the classroom teacher and the other nine students.

Dewey (1904) describes the kind of guidance that should be supplied to the student with the following comments:

> The work of the expert of supervision should be directed to getting the student to judge his own work critically . . . rather than to criticizing him too definitely and specifically upon special features of his work. . . No greater travesty of real intellectual criticism can be given than to set a student to teaching a brief number of lessons, have him under inspection in practically all the time of every lesson, and then criticize him almost, if not quite, at the very end of each lesson, upon the particular way in which that particular lesson has been

> taught, pointing out elements of failure and of success. Such methods of criticism may be adapted to giving a training-teacher command of some of the knacks and tools of the trade, but are not calculated to develop a thoughtful and independent teacher (Dewey, 1904, pp. 27-28).

Systems of feedback have also received increased attention in recent years. Twelker (1967) reports a system of controlled feedback in a classroom simulation setting. Based on the student's response to a problematic situation on film, one of several alternate feedback sequences is provided. Through such a simulation technique, the supervising teacher is able to control the stimulus events and thus shape the behavior of the student in training.

One-to-one and one-to-two teaching situations incorporated into the methods course can provide practice opportunities closely related to the laboratory point of view. A similar pattern was used in the In-Service Teacher Education Program at The University of Texas at Austin (1967). One or two individuals are taught for 15 or 20 minutes. Student teachers have the opportunity to implement approaches and strategies recommended and used in the methods course. A discussion immediately following the lesson provides feedback from an experienced teacher so that reinforcement is provided about the way in which these principles apply to this and to other teaching situations.

The Problem

Elementary children are not always readily available to provide practice opportunities for pre-service teachers, especially for methods courses and for summer school. To solve this problem, and yet provide practice within psychology and education courses, peers have been used as students for practice in teaching situations. This approach may have its limitations also, for peers may not act and think like children, especially if they are already familiar with the materials being treated in the lesson.

A need therefore existed to compare the aspects of practice with peers and with children, so that more information might be available to those responsible for the administrative decisions related to such practice.

Recognizing these areas of potential concern, the following two, main questions evolved about the training of pre-service teachers who are members of the science methods course:

1. What is the relationship between the achievement of specific teaching competencies and the type of treatment, such as the type of practice, the grade level and feedback?
2. What is the relationship between the change in attitude and the type of treatment, such as the type of practice, the grade level and feedback?

The Study

Subjects

The subjects of this study were 31 pre-service teacher-training students enrolled in the science methods course in elementary education at The University of Texas at Austin during the fall semester of the 1967-68 school year. Sixteen of the subjects were randomly assigned to teach children in the one-to-one and one-to-two setting at public elementary schools, while the other 15 taught their fellow peers from this same science methods course. Where possible, the subjects in the two groups were matched on the basis of previous education courses.

Low-Ratio Teaching Experience	Feedback Received	No Feedback
With Children	N = 8	N = 8
With Peers	N = 8	N = 7

Figure 1. Description of the Sample Subgroups

Treatment

The four types of activities that constituted this science methods course were class sessions, readings, laboratory and low-ratio teaching in the form of one-to-one and one-to-two teaching sessions. In each, the processes of science, behavioral objectives and inquiry teaching procedures were emphasized. The methods of instruction that were utilized throughout the class sessions and the laboratory emphasized student discussion and activity.

The one-to-one and one-to-two teaching sessions provided an opportunity for the student to apply the principles and approaches of the class sessions, readings and the laboratory in a simulated setting. Attention could be given to these strategies and techniques without the necessity of concern for classroom management. Such encounters provided the practice of theory without exposing the young teachers prematurely to the full responsibility for classroom instruction and management, a situation Dewey warned against.

Six of these low-ratio teaching sessions were distributed throughout the semester at two- or three-week intervals to permit the practice of new strategies and procedures as they were introduced in the course. Student-teacher interaction, inquiry development, questioning techniques, the construction and use of behavioral objectives and the design of an activity were some of the topics stressed concurrently in the class and teaching sessions.

Since the peers who served as pupils were taken from the same methods class, it was necessary to use two different lessons during each session. In this way, a student did not serve as a pupil for a lesson that he had prepared. Lessons were chosen from Science - A Process Approach. Because a university student might experience difficulty in assuming the role of a child, lessons were chosen that would offer subject matter content and processes with which the peers would not be readily familiar. The peers were instructed to act their normal role as students and not to try to assume the role of a child.

Feedback, by experienced teachers, was provided after each lesson to only half of each group. This feedback was coordinated with the topics as they were introduced in the class sessions. The experienced teacher encouraged the student to design or consider alternative strategies that might have been used to achieve the same goals. The teaching session was discussed from a nonevaluative viewpoint, i.e., rather than being judged good or bad, the lesson was considered a starting point for future development. Specific situations from the lesson were discussed instead of vague generalities. Attention was paid to practices that could be modified rather than to personality traits or habits that could only be changed with great difficulty.

The first and fifth teaching sessions were videotaped, and these provided the data for analysis of specific teaching competencies. Both sessions involved one-to-two practice. Each student taught the same pupil both times. Since the lessons had to vary because the pupils were the same, lessons were chosen that were related in content and process.

Data Analysis

The effect of both types of practice and feedback were determined by using a two-factorial analysis of variance of pre-post change scores on the following instruments.

Factor: Teaching Competency

To assess the role of feedback and of the type of practice in relation to specific teaching competencies, these videotapes were analyzed on the basis of three instruments designed to measure teaching competencies--the Instrument for the Analysis of Science Teaching, a 24 category system of interaction analysis, as developed by Hall (1968); the Classroom Observation Rating Form, a measure of classroom teaching strategies, as developed by Ashley (1967); and the Teacher Performance Competencies Scale, a rating scale designed by Steinbach (1968) based on the Stanford Teacher Competence Appraisal Guide (1965).

The specific teaching competencies on which the groups were compared were identified as teacher-pupil interaction, developing teacher-pupil rapport, pacing the lesson, presenting the lesson with clarity and using behavioral objectives.

Factor: Attitude

To assess the role of feedback and of the type of practice in relation to attitudes, a form of the Semantic Differential, as established by Osgood, Suci, and Tannenbaum (1957), was developed. The protocol phrases used were behavioral objectives, inquisitiveness in children, laboratory in college science courses, teaching, the content of science, inquiry, teaching science, laboratory in the science methods course, teacher talk, the processes of science, feedback and a quiet classroom.

Two factorial analyses of variance were used to determine the effects of feedback and of the type of practice based on the data from the above four instruments.

Findings

Low-ratio teaching with peers or children resulted in these findings:

1. Those students who taught children asked questions more and were more indirect than those who taught peers. On the

other hand, those who taught peers used overt silent activity more and urged more student talk.

2. There were no significant differences between students who taught peers and those who taught children in the development of teacher-pupil rapport.

3. With respect to their skill in pacing lessons, those students who taught peers had shorter lessons and had their pupils clarify their ideas more than those who taught children. Those who taught children used questions and teacher classification categories more.

4. Presenting the lesson with clarity appeared not to be related to the type of practice.

5. Although those students who taught peers were better able to have their pupils achieve the objectives of the first lesson, this advantage was not sustained on the fifth lesson while those students who taught children improved in this competency.

6. There was no significant difference between the attitude of the treatment groups.

Receiving feedback seemed to affect students in these ways:

1. Although students who received feedback maintained a higher teacher-pupil interaction during the first teaching session, this advantage was not sustained over those who did not receive feedback.

2. Students who received feedback had better rapport during the first teaching session. This advantage was not sustained through the fifth lesson over those who did not receive feedback.

3. Those students who received feedback were better able to gear the lesson to pupil needs than those who did not receive feedback.

4. Those students who received feedback were able to use their plans in such a way that their presentations were more logical (as determined by the TPCS) than those who did not receive feedback.

5. There was no significance in the use of behavioral objectives between those who received feedback and those who did not.

6. Those students who received feedback achieved a greater gain in their evaluation of teaching. In fact, those who did not receive feedback showed a regression in their evaluation of this protocol. Despite this shift, those who did not receive feedback had a greater gain in their positive evaluation of behavioral objectives.

Discussion and Conclusions

Type of Practice

Since children are a vital part of the regular classroom situation, practice with children, in contrast to practice with

peers, was expected to yield greater changes in each of the performance skills described in this study. Except for a few areas, those students who taught peers developed competencies and attitudes similar to those of students who taught children. Since the lesson materials were chosen to provide a challenge to both groups, peers might well have been equivalent to children as each exhibited behaviors characteristic of a learner. These results might well have been different if the peers had already been familiar with the content of the lesson.

Certain interaction and pacing skills were gained only by those who taught children. Those who taught children used questions and clarified their pupils' responses more, while those who taught peers made greater use of pupil overt activity. Those who taught children had longer lessons. Peers as pupils appeared to focus on the task more readily than children and performed it with fewer interruptions, while students who taught children had to spend more time on goal clarification. This difference in itself might lead one to use children exclusively for such practice sessions. Certainly, if peers alone are used, it should be understood that this important pacing skill may well be poorly developed. It would seem that a desirable arrangement for such practice sessions would be several sessions with peers to develop most skills, followed by several sessions with children to further develop those skills and to concentrate on the pacing skills.

Many studies of teaching behavior show a close relation between the Indirect/Direct Ratio and the Student Talk/Teacher Talk Ratio. In this study, however, those who taught peers were better able to elicit student talk and participation while becoming more direct. Further study seems in order in regard to the relationship between student participation and direct or indirect procedures.

Feedback

Within the framework of this study, feedback was found to be important in developing the skills of pacing the lesson and presenting the lesson with clarity. These are skills that would seem extremely difficult to develop in class discussions. Even in the practice sessions, these two skills were not developed by practice itself or by incidental feedback from discussions with fellow class members. The systematic feedback from experienced teachers was necessary to provide the information needed to improve these skills.

Both the students who received feedback and those who did not receive it considered feedback highly desirable. The evaluation factor for that protocol showed more improvement than any other item on the Semantic Differential. There were no differences, however, between the feedback and non-feedback group in their estimation of this aspect. Even the non-feedback group considered its contribution important.

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